

# MALL2000+

## A vision for a virtual marketplace for businessmen

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**Abstract.** The Internet and Electronic Commerce are changing how enterprises communicate and trade. However, in the European context, small companies have not yet found an appropriate environment. Electronic commerce in Europe appears to be dominated by a few large players leaving small and medium sized companies (SMEs) struggling to exploit this powerful medium. This raises the analogy of a mall, in which a few magnet stores (the big department stores) attract the customers and many small businesses flourish. These small businesses depend on common infrastructure and services, as they are not capable by themselves of providing the full range of needed facilities.

A European consortium starts work to establish an Internet-based virtual marketplace for businessmen doing Electronic Commerce. We identify the marketplace with the acronym *MALL2000+*.

- MALL2000+ is a mall for SMEs providing mostly professional services.
- MALL2000+ subscribers may act both as providers and consumers of services.
- Electronic interaction in MALL2000+ will be automated through agents. However, because of the complex nature of services offered by the providers, in addition consultation by humans will always be possible.
- Business areas that are representative of professional services that MALL2000+ is targeting typically are of a consultation nature. Special emphasis will be given to independent SMEs which often are one-person operations.
- General database services for a data/information universe will be provided. Interoperability will be supported through context specification and metadata management.
- A Common Service Organisation (CSO) will provide registration of new subscribers, configuration support, hotline support, billing services, etc. The CSO will function just as another subscriber offering its services in the mall.
- Usability evaluation of MALL2000+ will be performed. (cont.)

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- Object-oriented methodologies will be emphasised on top of a common object-oriented inter-connectivity platform. Both classical Smalltalk and emerging Java environments will be integrated. The architectural approach chosen allows by its OO-framework character flexible adaptation to new business requirements, evolution of networking facilities, and openness to ongoing developments/standardisation efforts.
- Within this infrastructure, *collaborative work-flows* for online business are realised through what we call *life programming*.

## 1. Introduction

Internet and Electronic Commerce are changing how enterprises communicate and trade. However small companies have not yet found an appropriate environment. Electronic commerce in Europe appears to be dominated by a few large players leaving SMEs struggling to exploit this powerful medium. This raises the analogy of a mall, in which a few magnet stores (the big department stores) attract the customers and many small businesses flourish. These small businesses depend on common infrastructure and services.

Scope of services for SMEs typically provided by MALL2000+ [1] is categorized and identified by some examples in chapter 2. Architectural highlights how services can be provided on an Internet-based, distributed network are given in chapter 3; the technical basis is an OO framework for instantiation and configuring service platforms. Chapter 4 discusses the relations between routine service offerings realized by *individual, predefined and computerised processes* and/or *agents* on one side and *personal involvement of subscribers* for non-routine service; we call this *demand-balanced*. Requirements for work-flow structuring and life programming are the topic of chapter 5. We conclude with remarks/recommendations on industrial relevance in chapter 6.

As a main contribution of MALL2000+ we see an integration of components to realise a flexible environment offering all European-wide business services for subscribers speaking different languages, living under similar, but different cultural and legal circumstances, etc.

At the moment MALL2000+ is a *vision*. We want to discuss the vision in the context of the Electronic Commerce section of EMMSEC'97 to come in contact with co-researchers in the field. It should help to provide enhanced facilities for European SMEs in doing business based on Internet in an international setting.

## 2. Scope of services supported by MALL2000+

Services supported by MALL2000+ are considered to fall into three categories. We give some examples for each of them.

### **Business services of all international business areas found in a real business mall:**

*Facilities and professional consultation offices  
for financial transactions and insurance,  
Lawyers, international legal consultation,  
Brokers,*

*Employment agencies,  
Engineering advisors,  
Information bureau's on public  
services in the neighbourhood.*

### **General, supportive service organisations:**

*Secretarial service, translation agencies,  
International transportation agencies and movers,  
„Yellow pages“ provider,  
Marketing research institutions, service pre-  
sentation (e.g., by electronic catalogues)*

*Engineering bureau's to support. (e.g.)  
installation / workflow specifica-  
tion & design / maintenance, etc.  
Support for business startup,  
Certification authorities.*

### **Common Mall Service:**

*Synchronous / asynchronous messaging service,  
General database service,  
Prompting service to renewed document  
presentation („Do not forget to do ...“),  
Queuing service for access to subscribers  
in persona / Control of a „Voice box“.*

*Mall administration,  
Training / tutoring / coaching services,  
„Hotline“,  
Equipment shop (for hardware /  
software etc), maintenance shop,*

Please note that the subscribers/business areas mentioned and services they offer/demand are typical of what we have in mind. In addition to their services, subscribers themselves contribute to the data/information universe through their databases, functionally considered to be part of a server component. With some **example scenarios** S1 through S6 we give high-lights of the kind of scenarios we have in mind. Requirements are coming up.

### ***S1 Acquiring of industrial equipment by an SME***

Imagine, there is a company A in country B of the EU. Management of A plans to acquire a new machine for their plant in country C. There are some preliminary steps before an order can be given:

- What companies, say  $D_1, D_2, \dots, D_n$ , in what countries, say  $E_1, E_2, \dots, E_m$ , offer machinery and under what conditions? Inquiries and search results are of a multimedia kind.
- How fit the detailed requirements of A to the technical specifications offered by  $D_i$ ?
- Time frame of delivery?
- How can the acquisition be financed? Tax and customs conditions?
- Who can translate all documents involved from and to language used in B and/or C?

Management of A will use MALL2000+ for all inquiries to a *company/product/specifications/conditions*-data/information universe; data/information discovery by agents is required in the server component as there is some vagueness in the inquiry and/or not an exact match with stored data. And management of A will ask some service providers for support, viz., engineering advisors, financing consultants, tax condition experts, translation services.

Eventually, an order is given to company  $D_i$  of country  $E_j$ . Now, other services become involved, insurance service for payments, international movers, certification authorities, to give examples.

From this scenario we gain some **general requirements** for the design of MALL2000+:

- There is a general “data/information universe” as a central server component.
- There are “subscribers” around using and communicating under MALL2000+.
- Subscribers are individual persons and/or computerised services provided by agents in a demand-balanced manner.
- Subscribers are “peers”, their roles are changing. They are laymen, so training / tutoring / coaching service is required.
- “Work flow” forms the basis of usage

As we don't have a common platform on subscribers' side the physical structure should be transparently realised, e.g., in a three-tier-client/server-structure; between clients (i.e., the MALL2000+ subscribers) we see the structure of a peer network.

### ***S2 Consultation for Insurance Service***

The following scenario takes place in the business area of insurance contracts.

Let us consider a MALL2000+ subscriber who wants to compare market opportunities relevant to basic coverage on truck accidents. He will query for optimal balance between factors like price, risk coverage, availability of human support, geographic extension of the contract, and so on.

In order to give a set of choices, an appropriate MALL2000+ service will require a number of data which are relevant partly to the subscriber's car like its type, horse power, registration year, general status („any accidents before?“), partly to the driver of the truck, age, address, the year he got his drive licence, and so on.

Data which are necessary to work out a contract proposal may widely vary both between individual companies and between different countries, partly because companies use different methods to evaluate risk, partly because they are subject to different national law constraints. The service will therefore perform some optimal matching between general form data and specific, company-depen-

dent requirements, possibly integrating the input data with some independently elaborated information, like the commercial value of the car for every country where a candidate proposal was found.

Eventually the subscriber will be presented with a form containing details of the various opportunities.

In order to make his choice, he might need further details, in this case MALL2000+ might route him towards the most appropriate online contact: if the candidate proposal was originated from another country, some transparent translation should be provided.

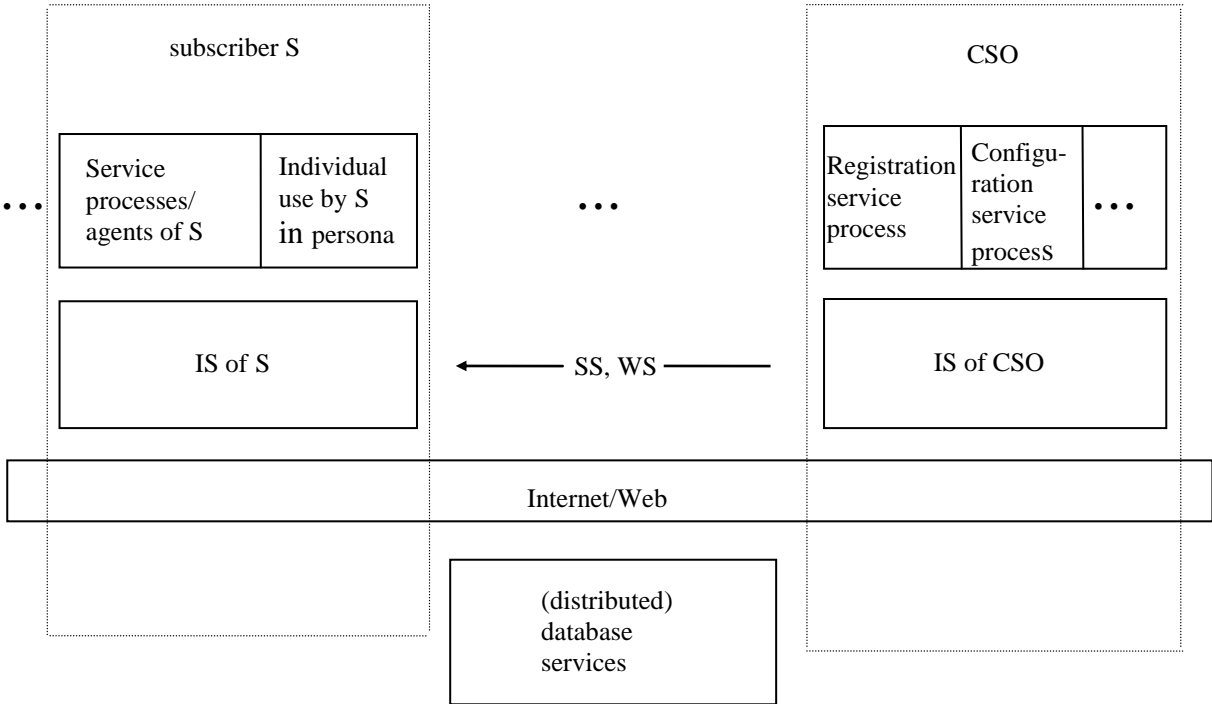
The scenario puts into evidence **some typical features of operability** for consultation:

- Need to cope with widely heterogenous market characteristics.
- Need of automatically triggering complex co-operations between different services.
- Difficulty in defining a set of input parameters which are general and invariant enough to build the required output when the data sources are shaped in accordance with different legal constraints or individual operating workflows.

**S3 Common Service Organisation**

Refer to **figure 1**. All steps are Internet-based if needed for communication.

1. The *Common Service Organisation*-subscriber (CSO) registers S and fixes the access rights of S.
2. S will use a service provided by CSO to describe specific requirements and a configuration process (an automated service of CSO) will take place. This means an instantiation of service software (SS) for S coming from the MALL2000+ framework.
3. S will download SS together with the required (parts of) MALL2000+ componentware(WS) to his computing environment. This becomes the MALL2000+ interface of S (IS).
4. S will link IS to its individual software to provide inter-operability.
5. S will activate pre-defined processes for the specific services to be offered to the other MALL2000+ subscribers.
6. S will activate the agents required to deliver the services of S.
7. S will in persona use MALL2000+ for his needs and will be available for other subscribers (not necessarily in a simultaneous, synchronous manner) for inquiries requesting human expertise and treatment.



**Figure 1: (layered) overall architecture of MALL2000+**

**S4 Translation service scenarios**

Foregoing scenarios show a lot of situations where messages, natural language inquiries, and forms have to be translated from one language to another one in doing European business. We expect a high number of translation requests to be of a routine kind where established, predefined and mechanized processes are applicable. Others need personal involvement of a human translator (e.g., as an independent SME subscriber). This person may also review and confirm important documents mechanically translated before (e.g., contracts) to guarantee legal binding.

The service could be organised as a virtual distributed translating office operating 24-hours a day which could include a number of information servers as well as human translators. As the typical MALL2000+ subscriber is not supposed to be multilingual he/she should rely on just-in-time cross-language translating services on demand.

### ***S5 Service presentation provided by multimedia information bureaus***

The generality and uniformity which are desired for MALL2000+ lead to considering the design of a generic catalogue consultation service, which could be a building block for many specialised business services. Work here will consider abstracting characteristics of some widely implemented Points Of Information (POI's) typically covering:

- Subscribers' individual service offerings
- Public administration services (licenses, automatic tax payment, passports, ...)
- Private advertising,
- Tourist information (travel, shopping, etc.)
- Last minute bulletins.

Two partners in the MALL2000+ project are presently involved in a national project EPK-fix for rapid generation of electronic, multi-media based catalogues[2].

Design of multimedia presentations for business-to-business communication (company profiles and brochures, product and service catalogues, electronic product support systems, order fulfilment systems. ...) which is necessary for (e.g.) a SME to be present and participate actively in an electronic mall, is a complex and tedious process. The design usually involves many specialists from different areas, working closely together: marketing experts and texters to provide the content, lawyers to supervise the content with respect to legal risks, especially in export oriented activities, translators to eventually translate the contents into different languages, designers to produce the artwork (drawings, ...), layouters to compose electronic media, technical and data base experts to organize the intertwining of the media with the existing DP of the company and finally programmers to realize them.

Again this scenario demonstrates the **diversity of required services**. Only OO-based framework realisation gives the chance to meet all requirements by acceptable efforts.

### ***S6 Business start-up***

Give an answer to questions like the following:

*"I plan to set-up economic activity X in country Y: which are the rules of the game? That is to say: what taxes? What legal constraints? What licences?"*

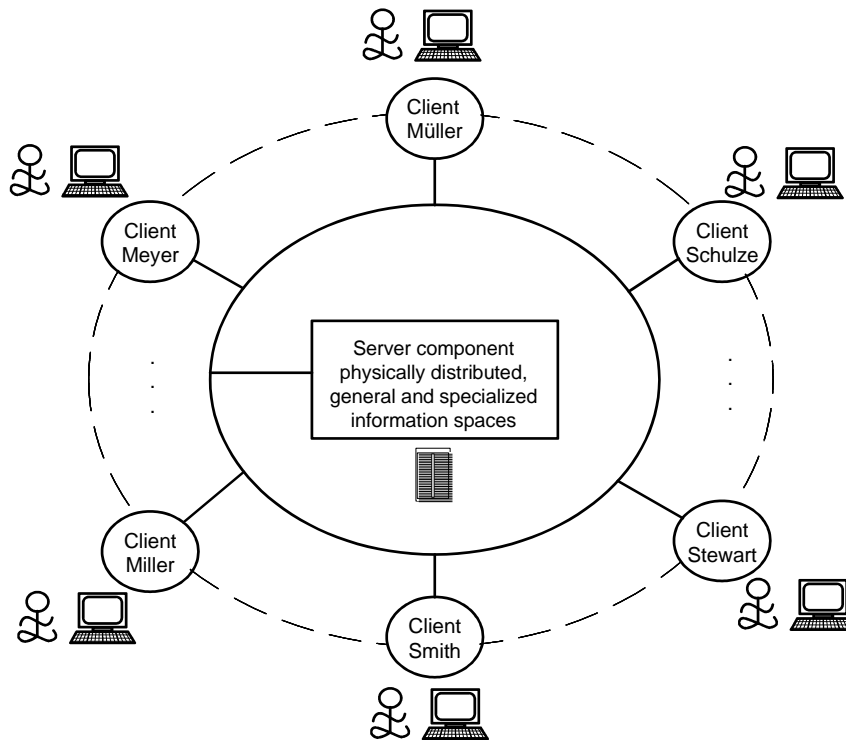
MALL2000+ could provide facilities for semi-automatic pattern matching of requirements by the subscriber over a list of candidate partners for the same activity.

## **3. Architectural highlights of MALL2000+**

The functional description of a typical MALL2000+ environment is depicted in **figure 2**, where the lines denote paths of access to the mall. The subscribers take the (functional) role of *clients*, the data/information universe of a *server*. The underlying physical structure is realised by communication services of the Internet/WWW. (the 'Web').

The **central mall component** has to provide the following main functionalities:

- Up-to-date online communication facility, open for future evolution,
- service and product browsing, supported by a catalogue facility,
- synchronous communication with subscribers (especially its agents),



**Figure 2: A typical MALL2000+**

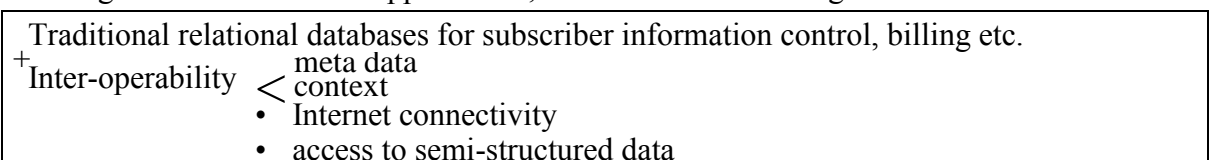
- flexible service / product offerings under individual, possibly changing *ad hoc* conditions,
- a general, public information repository base,
- asynchronous communication between mall subscribers in persona,
- mall organisation and service support.

From an implementation viewpoint MALL2000+ will consist of a *distributed framework of interrelated, object-oriented classes* – the **MALL2000+ framework**. These are considered to be an appropriate *componentware for Electronic Commerce* – the **MALL2000+ componentware**. We will work in a Smalltalk/Java based environment which flexibly supports above mentioned advantages and also provides necessary distribution capabilities over the Web.

Subscribers will not be obliged to use the same computer and communication equipment, leading to a variety of heterogeneous devices with presentation and manipulation models that will often differ considerably from window-based, direct manipulation desk top metaphor-based interfaces currently common on PCs. There has to be a **model-based abstract interface** for all services offered which can be mapped onto and from all computer and communication equipment available in medium term.

**Database services** in an electronic commerce setting such as MALL2000+ must provide three critical features: (i) easy Internet access, (ii) data inter-operability and unbundling of database functionality, and (iii) access to semi-structured data (see **figure 3**). Due to space limitations it is not possible to go in details.

We see the **trend towards Java technology** as a real asset in terms of flexibility of implementing distributed Internet applications, whether we are looking at a client/server architec-



**Figure 3: Requirements on up-to-date database services**

ture, or a peer network. As soon as Java stabilises, object communication, in form of objects with encapsulated functionality, will be used in conjunction with the Smalltalk/Java virtual execution engines at client sites.

In the scope of business areas covered as representative in the MALL2000+ project facilities for flexible **composition of multimedia documents** are essential. The architecture of the MALL2000+ framework will be based on the *HotDoc*-approach [3] which has already proven to allow rapid, robust design and implementation of various building blocks (*parts*) of documents in an active, multimedia usage surface for document composition, including, e.g., a simulation and planning tool, *HotSimple* [4].

Until now, HotDoc lacks support for „programming“ dynamic documents by endusers, i.e., subscribers. While a part designer can do nearly anything with HotDoc by writing the appropriate Smalltalk code for parts and layout policies, the enduser can only put preprogrammed parts on his workspace. To overcome this problem, a *visual scripting language* will be included (also providing links with the workflow feature). This language will be based on a preprocessor, which translates it to Smalltalk. Further parts, e.g., for form-filling situations found very often in business applications, will be added to the framework as well as for database/information universe inquiries.

HotDoc already now offers local group editing capabilities. General groupwork capabilities, internet-based, will be added. So, group editing, simulation and planning capabilities, already covered in the HotDoc-framework, will be enlarged for support of all demand-balanced services at subscriber sites in form of a capable, configurable and open OO-framework.

#### **4. Relations between routine and non-routine services, demand-balancing**

One cannot expect coverage of actual business requirements by fully automated, „mechanised“ (i.e., a priori programmed) services. The MALL2000+ environment allows under its **demand-balancing policy** smooth transition from computerised, predefined processes for routine work by agents, mainly responsible for searching, filtering, categorising activities and the like, to personal, interactive human intervention in case of non-routine work or authorisation of outcomes of non-human operation for legal binding. The MALL2000+ framework handles all „back-end“ tasks, e.g., in communication and/or access to databases showing an open interface to different kind of service circumstances under demand-balancing.

#### **5. Workflow structuring and life programming**

A **workflow feature** allows appropriate incorporation of demand-balanced services. The workflow specification and design component itself is a computerized assistant and planning system for

- consulting a subscriber about technical possibilities, risks and perspectives for setting up an electronic information media for doing business, and thus contributing to an electronic mall,
- customizing that electronic media with respect to the specific needs and intentions of his business and attaching the new media to the existing DP infrastructure within the business of the subscriber (e.g., for order processing and fulfillment)
- and setting up a (hierarchical) plan to realize the new media.

The generated plan will incorporate all necessary (internal departments or external) institutions for successfully implementing the electronic service and will be executed, as far

as possible, by electronic communication on the Internet/WWW, taking advantage of the services offered by MALL2000+ environment

Even the plan execution by help of traditional work-flow support systems will be different from traditional engineering process models, e.g., for software project implementation, in that the implementation process of the new electronic media is much governed by principles of a creative design approach instead of the traditional engineering approach. By this we mean that creative design people are used to work with a plenty of variants, from which the subscriber selects one or several, which then are combined into an advanced revision of the designed product. In traditional engineering, variants are utilized as elements of the design process only as little as possible, the design ideally follows a foreseen or elaborated mainstream without any deviation.

**Life programming** is a collaborative computational metaphor in which distributed computation is performed by collaboration of autonomous agents and humans both of which exist in the demand-balanced MALL2000+ environment. Unlike traditional workflow applications which are based on a *snapshot* of an organisation obtained by one or other form of analysis, *life applications* must *evolve* continuously. This places stringent demands on *non-stop operation*; *robustness to human or software agent failure*, *auditing*. Business life applications, where multi-agent life applications; where the agents execute in the environment of one or more business processes manipulating the business artefacts.

## 6. Conclusions

MALL2000+ when introduced can have a strong relevance on European industry, especially for SMEs. They have not to take care of business areas belonging to the supportive service organisations category (see section 1) and, even more, to the Common Mall Service. It allows companies to concentrate themselves towards their business kernel.

It will not be easy to find a good compromise between individuality of subscribers and the services they offer and the uniformity of realisation necessary from a technical viewpoint making participation within reach of SMEs. Easy transition of service from an (initially) human to a mechanized form is essential and should be supported by a flexible, adaptable workflow system.

In the paper at hand the need for and provisions to do *usability evaluation* is not covered in any detail. One of the partners has taken over responsibility to review MALL2000+ in so far.

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